

Revitalization of Occupational Safety and Health Teaching Materials Based on Life Based Learning Paradigms

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Abstract. Revitalizing OSH (Occupational Safety and Health) teaching materials is needed in line with the essence of OSH in the scope of education, work environment, and social life. OSH teaching materials used are still learning-oriented content, while the demands of the learning paradigm have shifted to Life Based Learning (LBL). OSH teaching materials in PTM (Mechanical Engineering Education) Study Programs need to be revitalized. The purpose of this study is : (1) producing OSH teaching materials; and (2) evaluating the results of the implementation of revitalized OSH teaching materials. The method used to achieve the research objectives is the Research and Development (R&D), which adopts the ADDIE (Analysis-Design-Development-Implementation-Evaluation) model. The instrument used was a questionnaire based on the feasibility of teaching materials based on students' apperception. Topics covered in this OSH textbook include the fire chapter, First Aid for Accidents (P3K), Occupational safety and health Management System (SMK3), occupational nutrition, radioactive and noise hazards, personal protective equipment (PPE), and ergonomics. The results of expert assessments (industry OSH experts and university lecturers) obtained an average rating of 85.6% as follows. The test results on 54 students showed an average total response of 83% showed that OSH teaching materials based on the LBL paradigm were very suitable for use in tertiary institutions.

Keywords: teaching material, OSH, paradigm, learning

Introduction

The technological revolution developed very rapidly in the second decade of the 21st century. It was radically capable of changing various lines of life in the world. The impact produces a new generation that is unique with special characteristics. They are Generation Z, born in the mid-1990-2010. In addition to being called Generation Z or Gen Z, they are also often called digital natives, screeners, gamers, Zeds, or some are calling it part of the millennial generation. Some of them are now in high school and college. That reality is present in our lives now.

It should be noted that a survey conducted by the Innovation Group (J. Walter Thompson Intelligence) [1] mentions that the privilege of generation Z is described as a creative generation of technologically savvy, self-starters (wanting to do something new as a profession to carve out his identity), hoping to turn a hobby into the main job reveals

independence, independence, a strong entrepreneurial spirit, accompanied by high motivation to carve their own future. (full-time job) [1]. Furthermore, suggested that generation Z has a composite visual image, because the part of the brain responsible for developed visual abilities is much better [2]. Although connected by technology and social media, it is very progressive when engaging in social activities or issues regarding social policy, upholding the same rights for all, regardless of gender orientation [3].

Responding to the uniqueness of the characteristics of the generation of Z above, which is none other than sitting in college, teaching materials also need to be developed in order to achieve learning objectives [4]. These special characteristics trigger changes in learning activity from fragmented segmental activities to integrated and interconnected activities. This learning paradigm is known as Life Based Learning with a focus on developing one's capability

(ability and willingness) to fully fulfill all of his life needs [5].

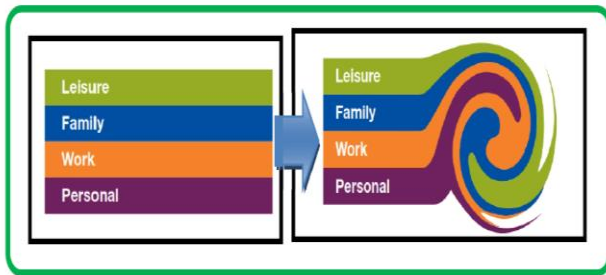


Figure 1. Illustration of Life Based Learning learning paradigm

Thus the life-based learning approach is aligned to be a policy in revitalizing OSH teaching materials. The key characteristics of Life-based learning are illustrated as a 10-leaf gear cycle producing an interconnected pattern as shown in Figure 2 below [6] [7]:

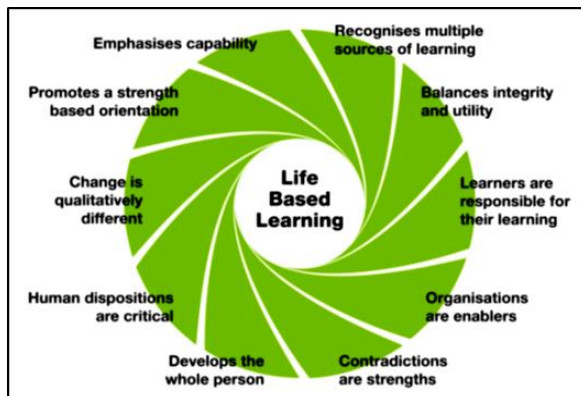


Figure 2. Key holistic and interconnected characteristics of Life Based Learning.

Teaching materials in the form of textbooks are still needed even though technological advances continue to develop because textbooks can be used anywhere, anytime [8]. Teaching materials are all materials (both information, tools, and texts) that are arranged systematically that display a complete figure of the competencies that will be mastered by students and used in the learning process with the aim of planning and studying learning implementation [9].

Good teaching materials according to [10] must contain: (1) Substance that is adequate and systematically presented to achieve learning objectives: (a) the substance of teaching materials must be in accordance with the curriculum at least covering aspects of the objectives/competencies to be achieved, methods and assessments used in the learning process; (b) teaching materials must be well

organized; (c) excessive repetition of teaching material due to overlapping teaching materials in various subjects, needs to be avoided; (d) teaching materials must also adhere to the scientific principle that is arranged and presented systematically and methodologically; (e) the rules of scientific writing should be retained; (f) the substance of the teaching material is prepared solely for the benefit of the students so that it must be arranged according to the level of thinking, interests, and socio-cultural background where the students come from; (g) teaching materials are arranged so that they are easily digested and mastered by students; (2) fulfills the presentation criteria: (a) uses language that is easy to read and understand; (b) graphics, are part of teaching materials relating to physical form and format. The format and physical form of teaching materials related to the size, cover design, content layout design, shape and size of letters, illustrations, colors, image composition, paper type and size, binding, and so on. The format and physical form play a role in luring students to be interested in reading, studying, and possessing these teaching materials.

Occupational Safety and Health (OSH), which is an essential subject in the field of vocational capable of influencing various sub-life and sub-structure of vocational competence courses in automotive / machine expertise in particular. The essence of OSH can be felt in practical procedures in workshops, industrial internships, and in everyday life in the community. The challenge that remains a problem that needs to be resolved is a work culture that is not in line with OSH at the workplace. Printed teaching materials (modules) better than electronic teaching materials (Lectora) in learning occupational safety and health (OSH) electricity in Electrical Installation Basic Subjects at SMK Negeri 3 Yogyakarta [11]. The purpose of this study is (1) producing OSH teaching materials; and (2) evaluating the results of the implementation of OSH teaching materials that have been revitalized based on the life-based learning paradigm.

Research Methods

This research is included in the type of research and development or R&D. Because the resulting product is in the form of OSH

teaching material development that has been revitalized from the perspective of a life-based learning paradigm, which will then be tested for its effectiveness to be used as teaching material, the development model used adopts the ADDIE (Analysis-Design-Development-Implementation-Evaluation). This model uses five stages of development namely, as shown below:

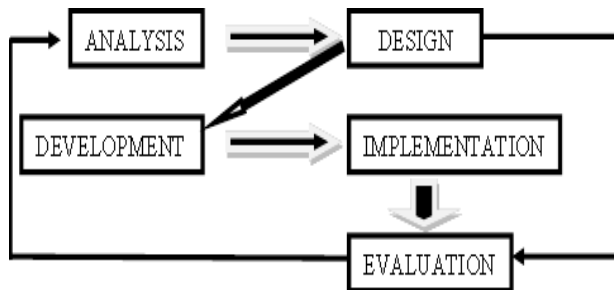


Figure 3. Research steps adopting the ADDIE Model [12].

The main subjects in this study were PTM students in both automotive and machining expertise. While other research subjects are industry OSH experts and college OSH experts. The sampling technique used was purposive random sampling. Data collection techniques using a questionnaire for students [13].

Results and Discussion

Product Produced

The products produced in this research are occupational safety and health teaching materials, which contain contents as listed in the table of contents below. The development of teaching materials is based on the Life Based Learning paradigm so that each topic of discussion includes more applications, cases, and research results that are strictly related to the industrial environment and everyday life [14].



Figure 4. Cover OSH teaching materials

Topics discussed in this OSH textbook include the fire chapter, First Aid for Accidents (P3K), OSH Management System (SMK3), occupational nutrition, radioactive and noise hazards, personal protective equipment (PPE), and ergonomics. The application of LBL in the material, for example, is emphasized in the discussion of the SMK3 chapter strengthened by the results of the study [15] on the analysis of work accident cases with OSH control system management in the manufacturing industry and the implementation of PPE in the design of operational standards for occupational safety and health procedures for teaching factory workshops in vocational school [16]. The same is true for other tires, reinforced by LBL's implementation in industry and daily life. The results of expert assessments (industry OSH experts and university lecturers) obtained an average rating of 85.6% as follows.

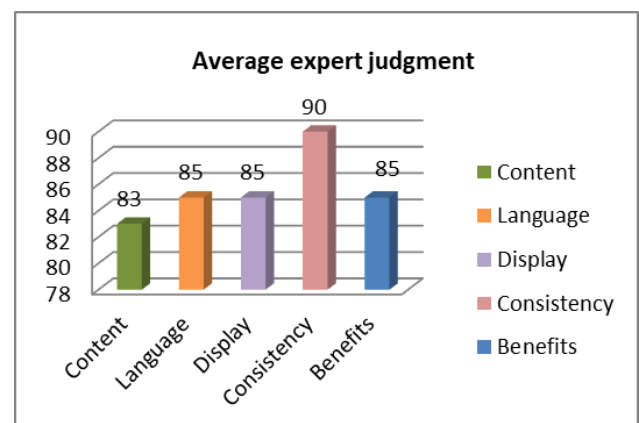


Figure 5. Diagram of Expert Assessment Results

Evaluation of Implementation of Teaching Materials

Revitalization teaching materials are implemented in two classes for occupational safety and health courses, with a total of 54 students.

Table 1. Results of student responses for each aspect of the large class

No	Aspect	Average Score of Each Aspect	Percentage
1	Material	19,89	83%
2	Languages	13,12	82%
3	Display	13,26	83%
4	Benefits in life	13,28	83%
Average Total Response		59,55	83%

Identification of the trend of high and low scores of Likert scale model research data with a range of 1-4 to 18 items obtained the lowest ideal score (X_{min}) = 18 and the highest ideal score (X_{mak}) = 72. The ideal mean \bar{X} of 45.5 and standard deviation ideally (SBx) is 9.

Table 2. Student response score intervals

Score intervals	Category
$X \geq 54$	Very decent
$54 > X \geq 45$	Worthy
$45 > X \geq 36$	Not feasible
$X < 36$	Very Inadequate

Based on Table 1. the overall average results can be seen that the score of 59.55 is included in the "very feasible" category because of $X \geq 54$. The students to be more interested in reading books by multiplying the application of material through examples that are related to cases or phenomena in the industrial environment and the environment of daily life [17].

Conclusion

Revitalization of occupational safety and health teaching materials with the Life Based Learning (LBL) paradigm approach is very feasible to be applied for the development of teaching materials in tertiary institutions.

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